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F4W

Selected US specifications from IPC sub-class F24C

(54) Solid fuel effect gas fire

(57) A solid fuel effect gas fire includes a housing 10, accommodating and supporting a fireback 13, constructed of a mineral fibre material, said housing having a flue outlet opening 14 in the upper side thereof. Within the housing is mounted a support pan 11 within which is positioned a gas distribution outlet arrangement 12. The pan 11, in use, is filled with vermiculite, and an arrangement of simulated coals or logs positioned thereon, such that adequate air passages are provided between the coals or logs to provide sufficient combustion air for efficient burning of the gaseous fuel provided.

The construction of the fireback 13 and the arrangement of the coals optimises the heat output efficiency of the solid fuel effect fire by the re-radiation of heat from the simulated coals and the fireback.

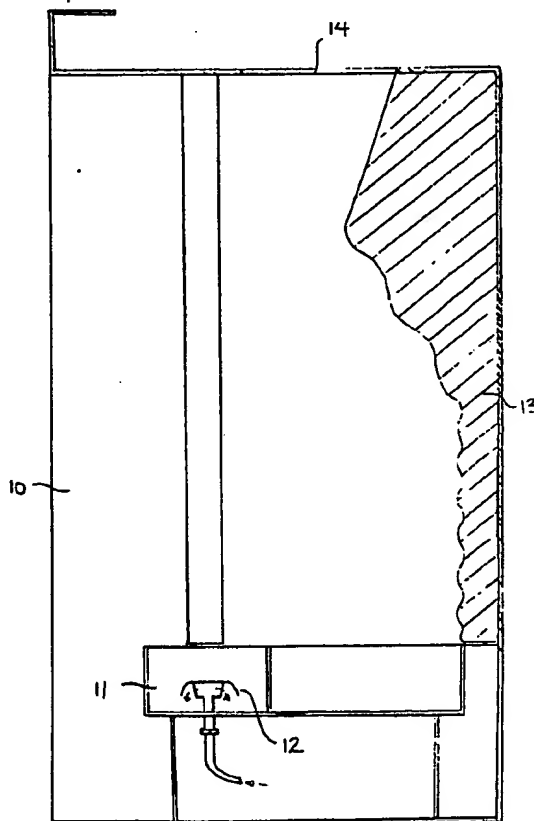


Fig 3

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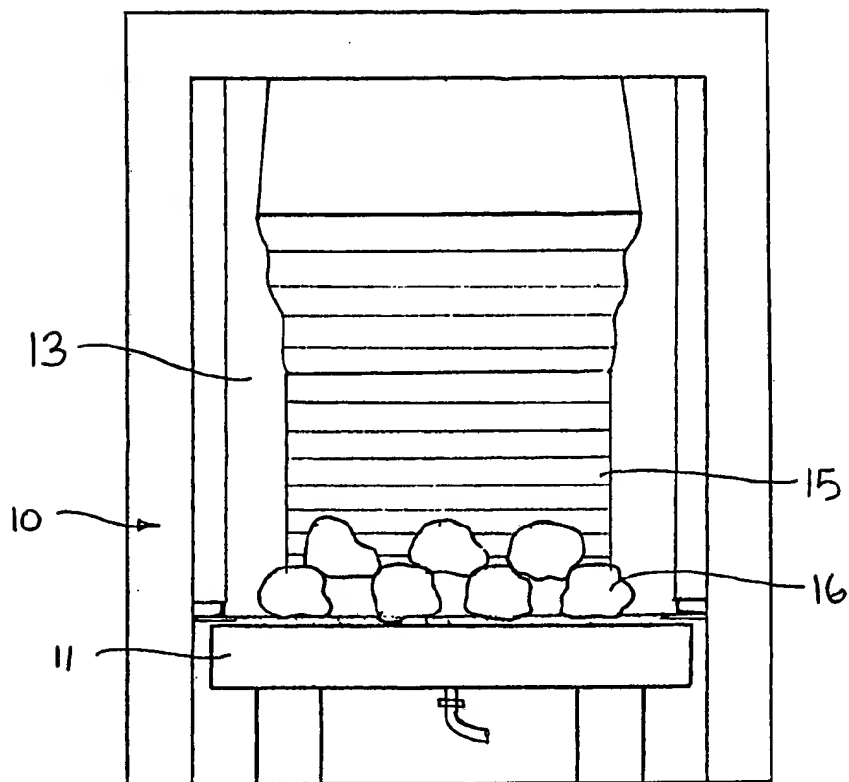


Fig 1

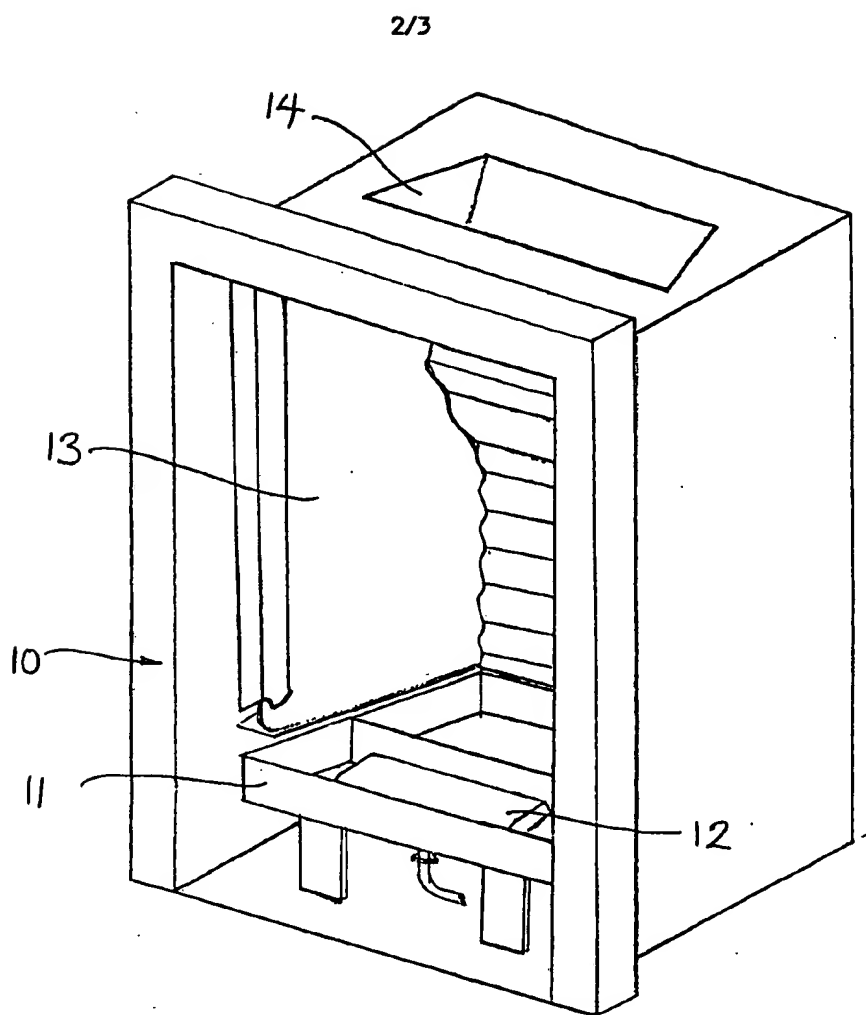


Fig. 2.

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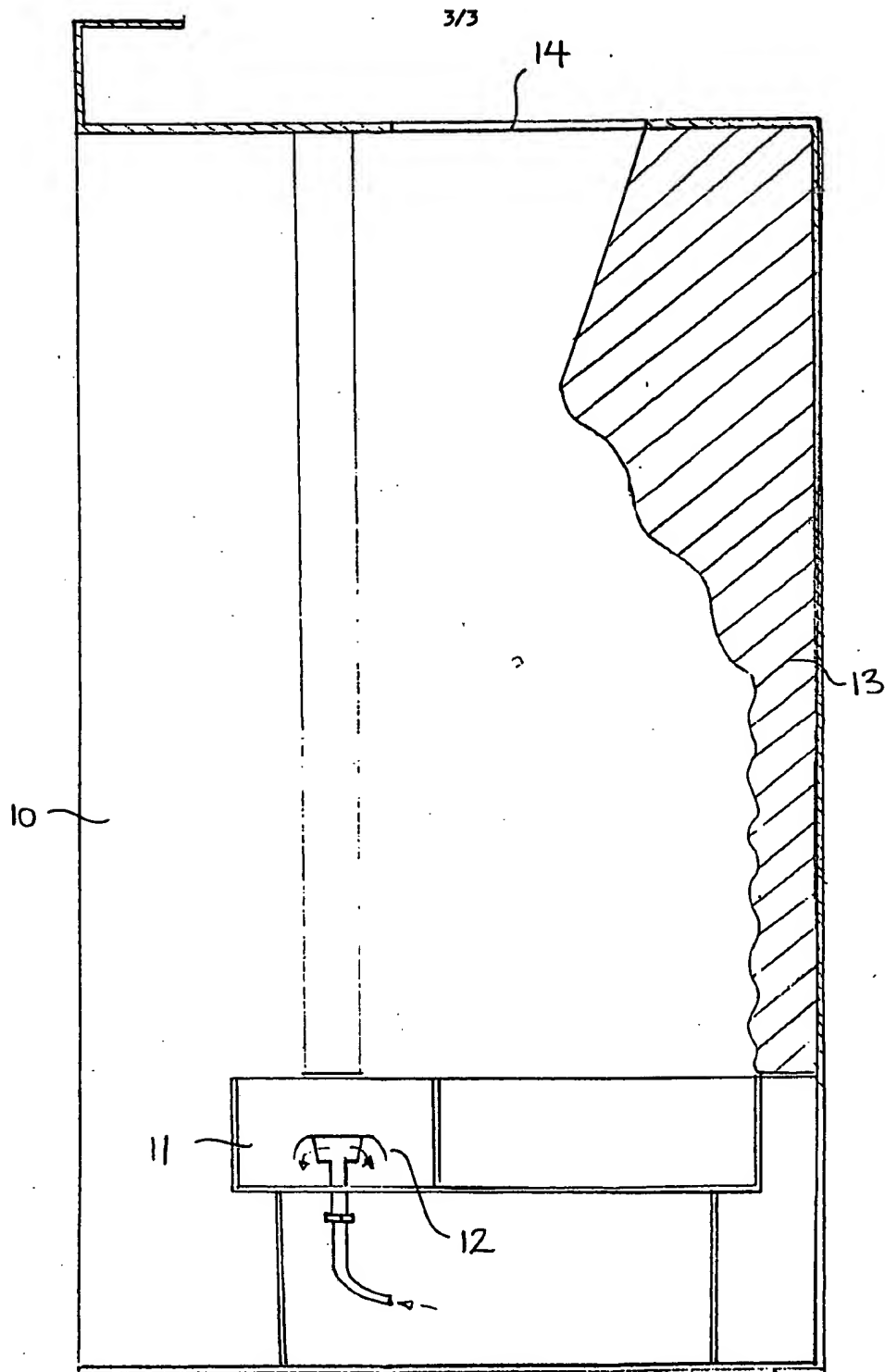


Fig 3.

## SPECIFICATION

### Solid fuel effect gas fire

- 5 The present invention relates to solid fuel effect gas-fuelled fires capable of giving the appearance of a solid fuel open fire, but which utilise the domestic gas supply as the fuel with simulated coals or logs arranged on the fire which glow when heated and give a pleasing appearance.

- 10 At present, a variety of different types of coal- or log-effect gas-fuelled fires are known in a variety of different designs, ranging from a simple burner unit which will fit into an existing fireplace and upon which simulated logs or coals may be placed to give a "living" flame effect, through to the more sophisticated, more fuel efficient convection-assisted appliances, which are constructed as a complete appliance which may be fitted in front of an existing opening, but in which the burner unit is totally enclosed in a glass fronted housing.

- 25 The simplest of these known types of gas fire utilise the existing fireplace and fireback, and the appliance simply provides a replacement grate incorporating a gas burner on to which the simulated coals can be arranged, in which, when the appliance is lit, the burning gas heats the simulated logs or coals and produces flames, which, when combined with the glow of the heated simulated coals or logs, gives the effect of a solid fuel fire.

- 35 However, such a simple arrangement has various disadvantages, in that firstly it is very fuel inefficient so that the heat output for the amount of gas used is very low, secondly in order to ensure that any unburnt gases or noxious combustion gases are properly vented from the fireplace, class 1 flue must be provided and the grate generally will be spaced from the fireback and sides to allow for variations in manufacturing tolerances so that secondary air is drawn into the fire. The result of this latter effect is that cold air drawn into the fire, from the room in which it is located and is drawn up the sides and back of the grate, which thereby cools the fireback and sides and also cools the coals around the edges of the fire. This reduces the efficiency and adversely affects the appearance of the fire, in that the outer coals do not glow as readily as the central coals, and therefore, the fire itself is less pleasing.

- 55 In contrast, the totally enclosed convection-assisted appliances are considerably more efficient, since the enclosure of the appliance enables fuller control of the heat output and exhaust gases, so that, in addition to radiant heat, convection may be utilised as a means for utilising the heat produced by the burning gas, and fires of an efficiency exceeding 50% can be produced. However, such appliances are relatively expensive and are not entirely

satisfactory in their appearance, in that the 'coal effect' is enclosed within a glass-fronted housing and therefore does not have as close a resemblance to a conventional solid fuel fire as might be preferred.

- 70 It is the object of the present invention to seek to provide a solid fuel effect gas-fuelled fire which as closely as possible resembles a conventional open solid fuel fire whilst maximising the efficiency of heat output, although it is not expected to achieve the levels of efficiency achieved from closed solid fuel effect gas-fuelled appliances.

- 80 According to the present invention there is provided a fireplace unit for a gas burning fire capable of providing the effect of a solid fuel fire, comprising an open fronted housing supporting a ceramic fibre fireback and a pan for receiving material for providing a solid fuel effect and including a gas distribution outlet.

- 85 In order to achieve a pleasant and efficient effect, the pan is fitted in a close relationship with the fireback. In order to provide a secondary source of air for maximising the combustion of the gaseous fuel, in addition to the primary source of air admixed with the gas at or around the gas outlet, an appropriate arrangement of the simulated coals or logs should be provided thereby ensuring adequate air passages between adjacent coals or logs to provide a satisfactory air supply. If necessary, the logs or coals may be suitably interconnected to one another, e.g. by wiring them together, to permanently determine the necessary air passageways. Further, three rectangular notches are preferably provided in the fireback to provide discrete secondary air ports. These notches are taken out of the bottom edge of the back face of the fireback and are sized to allow sufficient secondary air flow to ensure satisfactory combustion without providing excess convection air and cooling of the fireback. The notches are positioned in line with the front to back air passages through the coals.

- 110 The simulated logs or coals are of a standard construction and are formed from a slurry containing ceramic fibre, colloidal silica and starch—the starch simply provides wet strength and inhibits the migration of the silica to the surface, and burns off when the coals are heated. The simulated logs or coals are suitably supported on the pan on a vermiculite base which also serves to distribute the fuel, thereby acting as a bed or dispersion medium and simulating ash or cinders.

- 120 The simulated coals in one arrangement may comprise a bottom layer arranged in three rows on the pan, tapering back following the shape of the fireback. A second layer is then placed on the first layer but only comprises two rows, namely a centre and rear row, and the third layer then has a rear single row only.

- 130 In an alternative arrangement, we make four coals of about the same plan area as a con-

ventional coal, but of the order of two and a half times the height. A further four coals are made of some three times the height. These are adhered like eight 'skyscrapers' on to a piece of fibre ceramic board, the tallest at the back, with appropriate spacing. The separation baffle across the fire pan is formed so that it has a forward facing flange, the upper surface of which is lower than the rim of the pan by the thickness of the fibre ceramic board to which the coal towers are adhered. The rear compartment is then filled with vermiculite only to the height of the top surface of this flange and the coal assembly is rested on this surface, its outside area being marginally less than that of the pan. The top surface of the base of the coal towers is then coincident with the rim of the pan.

The front compartment is filled with vermiculite to the level of the rim of the pan and on this surface is laid a one-piece 'H' shaped front coal, whose width is that of the pan. The gap above and below the elongated central bar of the 'H' is about an inch. The gas flames are therefore drawn underneath the central bar for the whole of its length, the only flame impingement on a cold surface is that occurring at the ends i.e. the vertical bar of the 'H'. Since one of the causes of poor combustion is the cooling of the flame by impingement on a cold surface, this arrangement improves the combustion performance quite substantially. We have found that we can pile on a further 21 coals in any random arrangement which is mechanically stable without causing problems of combustion performance. In 'units' of coals, this is equivalent to about 45 coals giving a much greater volume of red hot coals than the more normal 30 actual.

The fireback, made of a fibrous material as referred to above, is of a similar shaping to a conventional concrete fireback and is produced by introducing a mould of suitable conformation into a slurry containing the fibre, the mould being of a perforated material so that the majority of the water may be extracted from the fireback during moulding by applying a vacuum thereto and the fireback may then be removed from the mould and left to dry and harden. In view of the nature of construction of the fireback, it must be supported and protected within a housing, since it will not withstand severe handling. In view of the manner of manufacture of the firebacks, it is possible to incorporate mouldings thereon and it has been found to be of advantage to incorporate a corrugated surface which assists in the re-radiation of heat from the fireback when in use.

The present invention will now be described further with reference to the accompanying drawings, in which:

Fig. 1 illustrates a fireplace unit according to the present invention when viewed from the front;

Fig. 2 is a perspective view of the fireplace unit; and

Fig. 3 is a section through the fireplace unit of Figs. 1 and 2.

Referring firstly to Fig. 1, the fireplace unit 10 includes a support pan 11, in which a gas supply outlet 12 is provided. Accommodated and supported in the housing 10 is a fireback 13 which is preferably constructed of a mineral fibre material, preferably the same as that utilised for currently producing simulated logs or coals for existing coal effect fires, although it is envisaged that other materials could be utilised, if preferred. In addition the housing 10 has a flue outlet opening 14 in the upper side thereof.

The fireback 13 is of a conventional shape to that of existing concrete firebacks, but in addition includes an undulating or corrugated rear surface 15, which assists the performance of the fire, in use.

As shown in Fig. 1, the simulated coals 16 are arranged in a pattern which provides for openings between the coals so that adequate air supply can be provided for complete combustion of the fuel gas in view of the close fitting nature of the pan 11 to the fireback 13, and if necessary the coals can be wired together to ensure that such a pattern is retained by the user. Such secondary air is necessary to ensure maximum combustion of the gases and to thereby reduce the unburnt gases and to prevent noxious combustion products spilling back into the room in which the fire is located, in order to comply with safety requirements.

In the pan 11 a gas dispersion medium, e.g. vermiculite, is provided to distribute the gas fuel, which then burns around the simulated coals or logs 16 to provide a pleasing effect, similar to a conventional solid fuel fire. In addition, due to the close fitting nature of the pan 11 to the fireback 13, and due to the material of the fireback, the simulated coals are evenly heated around the whole of the surface of the fire pan 11. The fireback also heats and glows in a similar manner contributing to the radiant heat output of the fire and thereby improving the efficiency thereof compared to conventional open gas-fuelled, solid fuel effect fires, there being no cold secondary air drawn up the back and sides of the grate or pan to cool the coals and the fireback.

Whilst the invention is primarily intended to be used for log- or coal-effect type fires, it is envisaged that the materials could be utilised to achieve different novel effects for example using materials to simulate rocks or boulders rather than coals and to produce pleasant unusual artistic effects if desired.

Although the housing 10 is preferably a closed structure for adequately supporting and protecting the fireback 13, this could be a mesh or lattice structure if preferred, and since the fire pan 11 is inset into the fire-

place, an appropriate, decorative front can be provided to enhance the appearance of the fire, in use.

## 5 CLAIMS

1. A fireplace unit for a gas burning fire capable of providing the effect of a solid fuel fire, comprising an open fronted housing supporting a ceramic fibre fireback and a pan for receiving material for providing a solid fuel effect and including a gas distribution outlet.
2. A fireplace unit as claimed in claim 1 in which the pan including the gas distribution outlet is filled with a bed of porous material simulating, in use, cinders and glowing ash and supporting a plurality of simulated coals or logs arranged in a predetermined manner.
3. A fireplace unit as claimed in claim 2, in which the simulated coals or logs are arranged to provide a plurality of air passages therebetween to enable adequate air supply to enable efficient combustion of the gaseous fuel.
4. A fireplace unit as claimed in any preceding claim, in which a plurality of notches are provided in the fireback to provide discrete air ports for secondary combustion air.
5. A fireplace unit as claimed in claims 3 and 4, in which said notches are aligned with the air passages provided between the adjacent logs or coals.
6. A fireplace unit as claimed in claims 3 to 5, in which the simulated coals or logs are wired or moulded together into a predetermined arrangement.
7. A fireplace unit as claimed in any of claims 3 to 6, in which the simulated coals or logs are arranged in three layers, the bottom layer being arranged in three rows on the pan and tapering rearwardly following the shape of the fireback, a second layer being placed on the first layer, said second layer comprising two rows, namely a centre and rear row, and a third layer placed on the second layer, the third layer comprising a single rear row only.
8. A fireplace unit as claimed in any preceding claim in which simulated coals are provided on a fibre ceramic board, a first row of coals being of a height two and a half times their width and a rear row of coals being of a height three times their width, the coals being adequately spaced to provide air passages therebetween, such arrangement being placed on the rear portion of the support pan; a further separate 'H' shaped coal being supported on the front portion of the support pan, such 'H' shaped simulated coal being of a width corresponding to that of the pan, and the elongated central bar of the 'H' being narrower than the edge portions so as to provide a gap; and a plurality of loose coals being provided, which are arranged in a random fashion on the other coals.
9. A fireplace unit as claimed in any preceding claim in which the simulated coal and fireback material are comprised of a mixture of a

colloidal silica, mineral fibre and a starch binder.

10. A fireplace unit as claimed in any preceding claim in which the fireback is moulded to incorporate a corrugation on the surface thereof to increase the surface area and improve re-radiation of heat from the fireback in use.

11. A fireplace unit as claimed in any preceding claim in which a plurality of simulated rocks or boulders are provided in a predetermined arrangement of the support pan.

12. A fireplace unit substantially as hereinbefore described with reference to the accompanying drawings.

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TITLE: Solid fuel effect gas fire - has gas distribution outlet pan filled with vermiculite to support simulated coals

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The solid fuel effect gas fire includes a housing (10) accommodating and supporting a fireback (13) constructed of a mineral fibre material. The housing has a flue outlet opening (14) in the upper side. Within the housing is mounted a support pan (11) within which is positioned a gas distribution outlet arrangement (12).

A fireplace unit of a gas burning fire capable of providing the effect of a solid fuel fire, comprising an open fronted housing supporting a ceramic fibre fireback moulded substantially in the shape of a conventional fireback, and a pan for receiving material for providing a solid fuel effect and including a gas distribution outlet.